Contribution ID: **65** Type: **Oral**

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Tuesday, 25 April 2017 10:30 (15 minutes)

THE RADIOTRACER 7Be IN STUDYING ENVIRONMENTAL PROCESSES

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The objective of the study is to define the time delay between the elevation of tropopause and the concentration of the radiotracer 7Be in near surface air in order to understand the aerosol transport inside the troposphere as a part of the general atmospheric cycle transfer.
The relatively short-lived 7Be radionuclide (t1/2 = 53.3 d) of cosmogenic origin occurs permanently in the atmosphere. It is formed continuously by the interactions of cosmic-ray particles with atmospheric nitrogen and oxygen. The 7Be production rate depends primarily on latitude, altitude and the 11 –year solar cycle and has been proved powerfull tool in studying atmospheric processes.
The concentrations of 7Be in the troposphere and near the ground level show variations which are connected with air mass exchange between the stratosphere and the troposphere, in situation of tropopause folding events. Air coming from the upper troposphere or from stratosphere can be identified by its enhanced 7Be levels.
The tropopause marks the boundary between troposphere and stratosphere. The height of tropopause is variable in space and time, because of the latitudinal and seasonal dependence of solar irradiation as well as the changes due to weather patterns. There is a well-marked "tropopause gap"or break where the tropical and polar tropopause overlap at 30°-40° latitude. The break is in the region of the subtropical jet stream and is of major importance for the transfer of air and tracers (humidity, ozone, radioactivity) between stratosphere and troposphere. The height of the tropopause varies seasonally and also daily with the weather systems.

Fig. 1 Correlogram between 7Be surface concentration and tropopause height

The current study presents an analysis of 7Be data at geomagnetic latitude of 40°N. In Fig. 1 is presented the pattern of the cross-correlation analysis of 7Be surface concentration values and tropopause height. It is clearly shown that after the third day the Correlation Coefficient falls dramatically. The Rmax was found in the third day (˜0,44).
The study revealed that the concentration of 7Be at surface air is expected to correspond within 3 days after the changes of the tropopause height. Moreover, measurements and calculations throughout the research were extremely beneficial in a variety of ways and led to the following findings:
 The verification of the yearly variations of the tropopause height in mid attitudes.
 The understanding of aerosol transport inside the troposphere as a part of the general atmospheric cycle transfer.
 That the persistence in the state of the atmosphere cannot be ignored.
 Temperature and tropopause height indicate the time of transport of a useful tracer radioactive nucleus through air transfer cycles and as a consequence of any other aerosol particle with similar origin inside the

tropopause.
 Higher values of temperature or tropopause height result to shorter transport times.

Country/Organization invited to participate

Greece

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Session Classification: B04

Track Classification: RADIATION TECHNOLOGIES FOR MEASUREMENT